the second impedance probe. Applicants believe claim 11 is patentable over the references because, for instance, they do not teach or suggest the recited impedance monitor and processor.

The Examiner concedes that Salimian et al. do not meet the limitations of the recited impedance monitor electrically coupled to the HF electrode and the LF electrode (Office Action at page 3), among others. The Examiner alleges that Patrick et al. discloses measuring the chamber impedance (Office Action at page 6). The Examiner concedes that Patrick et al. does not disclose the use of a substrate holder as a low frequency (LF) electrode and a different high frequency (HF) electrode. The Examiner alleges, however, that Patrick et al. discusses applying either or both HF or LF power to the chamber electrodes, and that Patrick et al. discloses measuring the chamber impedance (Office Action at page 10).

Applicants note that Patrick et al. at column 1, lines 49-53 states "This RF energy may be low frequencies (below 550 KHz), high frequencies (13.56 MHz), or microwaves (2.45 GHz)." It does **not** disclose both HF and LF as alleged by the Examiner.

The Examiner concedes that Patrick et al. does not have both LF and HF electrodes, but alleges that Salimian et al. remedies this deficiency by allegedly disclosing impedance measuring of the HF electrode at column 7, lines 35-40, and impedance measuring of the LF electrode at column 6, lines 24-28 (Office Action at page 10).

Applicants note that Salimian et al. discloses a high frequency (HF) electrode at 13.56 MHz and a very high frequency (VHF) electrode at 60 MHz (col. 2, lines 49-51). The electrode described at column 6, lines 24-28 at 60 MHz is a VHF electrode, **not** an LF electrode.

Moreover, Salimian et al. at column 6, lines 24-28, merely discloses a 60 MHz Matchbox 26 for matching the impedance of coaxial cable 24 to the impedance presented by the VHF electrode 20, and at column 7, lines 35-40, merely discloses a 13.56 MHz Matchbox 50 for tuning out any difference in impedance between transmission line 52 and the HF electrode 22. Nothing in Salimian and the other cited references teaches or suggests first and second impedance probes to measure impedance at the HF and LF electrodes, and a processor for adjusting processing conditions based on the measurements.

Furthermore, the two impedance probes as recited in claim 11 are novel and produce new and unobvious results. Measuring the impedance separately at the HF electrode and at the LF electrode can provide important information regarding the system and the process. For instance, the specification at page 25, line 25 to page 27, line 14 (Figs. 8-10) describes the use of independent impedance measurements at the HF and LF electrodes in conjunction with other measurements such as phase angle and current intensities to analyze the effects on ion

bombardment, wet etch rate, and other film properties. Thus, the claimed system produces new and unobvious results.

For at least the above reasons, Applicants respectfully submit that independent claim 11, and claims 3, 4, 6, 12-14, 19, and 23 depending therefrom, are patentable.

Claim 5 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Salimian et al. as applied to claims 3, 4, 6, 11-14, 16-20, and 22-26, and further in view of Boys et al. The Examiner asserts that it would have been obvious to consider the pressure control system as allegedly described in Boys et al. to be an obvious extension to the Patrick et al. control system and impedance data collection and processing.

It is not clear how Patrick et al. is relevant since the rejection is based on the combination of Salimian et al. and Boys et al. Nonetheless, Boys et al. does not cure the defects of the other references since Boys et al. also fails to disclose or suggest the impedance monitor and processor as recited in claim 11 from which claim 5 depends. Therefore, claim 5 is patentable.

Claim 21 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Salimian et al. as applied to claims 3, 4, 6, 11-14, 16-20, and 22-26, and further in view of Grewal et al. The Examiner asserts that it would have been obvious to modify the Salimian et al. plasma processing reactor by implementing the independent source control as allegedly taught Grewal et al. to provide increased plasma volume geometric (anisotropic) control.

Applicants note that Grewal et al. also fails to disclose or suggest the impedance monitor and processor as recited in claim 11 from which claim 5 depends. Therefore, claim 21 is patentable at least due to its dependency from allowable claim 11.

New dependent claims 27-29 recite additional feature that are not taught or suggested in the references. For example, claim 27 recites that the processor is configured to adjust a pressure in the deposition chamber based on measurements by the first impedance probe and the second impedance probe. Claim 28 recites that the processor is configured to adjust at least one of a high frequency RF power level of the power source and a low frequency RF power level of the power source, based on measurements by the first impedance probe and the second impedance probe. Claim 29 recites that the processor is configured to adjust a setting of the impedance tuner based on measurements by the first impedance probe and the second impedance probe. These are disclosed in the specification, for example, at page 28, line 23, to page 29, line 8.

Claims 16, 24, and 30

Independent claim 16 and claim 24 depending therefrom stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Salimian et al. in view of Patrick et al. and Kinoshita et al., Maher et al., and Ohmi.

Applicants respectfully assert that claims 16 and 24 are patentable because, for instance, the references do not disclose or suggest the variable capacitor and matching network as recited in claim 16 from which claim 24 depends.

New claim 30 depends from claim 24, and further recites that the computer processor is configured to adjust a pressure in the deposition chamber based on measurements by the first impedance probe and the second impedance probe, which is neither taught nor suggested in the references.

In the Office Action dated November 3, 1999, the Examiner indicated that claim 16 would be allowable if rewritten in independent form including all the limitations of the base claim and any intervening claims. Accordingly, Applicants rewrote claim 16 in independent form in the Amendment filed on February 2, 2000. The Examiner, however, rejected claim 16 in the Office Action dated April 18, 2000. During the telephone interview on May 30, 2000, Applicants' counsel, Chun-Pok Leung, sought clarification from the Examiner as to why claim 16 was rejected. The Examiner maintained the rejection in the advisory action dated July 7, 2000 and in the present Office Action dated January 16, 2001 without any comments regarding the basis for rejecting claim 16. Applicants respectfully submit that claim 16, 24, and 30 are patentable. **If the Examiner maintains the rejection of claims 16 and 24, Applicants would request the Examiner to more clearly set forth the basis for the rejection.**

Claims 20 and 26

Independent claim 20 and claim 26 depending therefrom stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Salimian et al. in view of Patrick et al. and Kinoshita et al., Maher et al., and Ohmi.

Applicants respectfully assert that claims 20 and 26 are patentable because, for instance, the references do not disclose or suggest the variable capacitor and matching network as recited in claim 20 from which claim 26 depends.

In the Office Action dated November 3, 1999, the Examiner indicated that claim 16 would be allowable if rewritten in independent form including all the limitations of the base claim and any intervening claims. Accordingly, Applicants rewrote claim 16 in independent form in the Amendment filed on February 2, 2000. The Examiner, however, rejected claim 16 in the Office Action dated April 18, 2000. During the telephone interview on May 30, 2000,

Applicants' counsel, Chun-Pok Leung, sought clarification from the Examiner as to why claim 20 was rejected. The Examiner maintained the rejection in the advisory action dated July 7, 2000 and in the present Office Action dated January 16, 2001 without any comments regarding the basis for rejecting claim 20. Applicants respectfully submit that claims 20 and 26 patentable. **If the Examiner maintains the rejection of claims 20 and 26, Applicants would request the Examiner to more clearly set forth the basis for the rejection.**

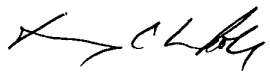
Attached hereto is a marked-up version of the changes made to the claims by the current amendment. The attached page is captioned "**Version with markings to show changes made**."

CONCLUSION

In view of the foregoing, Applicants believe all claims now pending in this Application are in condition for allowance. The issuance of a formal Notice of Allowance at an early date is respectfully requested.

If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at 650-326-2400.

Respectfully submitted,



Chun-Pok Leung
Reg. No. 41,405

TOWNSEND and TOWNSEND and CREW LLP
Tel: (415) 576-0200
Fax: (415) 576-0300
RL
PA 3129228 v1

Version with Markings to Show Changes Made

11. (Thrice Amended) A substrate processing system comprising:

a deposition chamber comprising a reaction zone;

a substrate holder that positions a substrate in the reaction zone;

said substrate holder comprising a low frequency (LF) electrode;

a gas distribution system that includes a gas inlet manifold for supplying one or more process gases to said reaction zone;

said gas inlet manifold comprising a high frequency (HF) electrode;

a plasma power source for forming a plasma within the reaction zone of said deposition chamber; **[and]**

an impedance monitor comprising a first impedance probe electrically coupled to said high frequency electrode to measure the impedance at the HF electrode and a second impedance probe electrically coupled to said low frequency electrode to measure the impedance at the LF electrode; and

a processor coupled with the impedance monitor for adjusting processing conditions of the deposition chamber based on measurements by the first impedance probe and the second impedance probe.

17. CANCELED.

18. CANCELED.

20. (Thrice Amended) A substrate processing system comprising:

a deposition chamber comprising a reaction zone;

a substrate holder that positions a substrate in the reaction zone;

said substrate holder comprising a low frequency (LF) electrode;

a gas distribution system that includes a gas inlet manifold for supplying one or more process gases to said reaction zone;

said gas inlet manifold comprising a high frequency (HF) electrode;

a plasma power source for forming a plasma within the reaction zone of said deposition chamber;

an impedance monitor electrically coupled to said high frequency electrode and said low frequency electrode, said impedance monitor including an impedance monitor variable capacitor;

a processor communicatively coupled to said impedance monitor for receiving as an input a measured impedance level of said plasma;

a variable capacitor electrically coupled to said LF electrode and controllably coupled to said processor wherein said processor adjusts a capacitance level of said variable capacitor to vary the impedance of said plasma in response to an output of said impedance monitor; and

a matching network coupled between a low frequency RF generator and said variable capacitor, wherein said matching network includes capacitors that are different than said variable capacitor.

25. CANCELED.

27. (New) The substrate processing system of claim 11 wherein the processor is configured to adjust a pressure in the deposition chamber based on measurements by the first impedance probe and the second impedance probe.

28. (New) The substrate processing system of claim 11 wherein the processor is configured to adjust at least one of a high frequency RF power level of the power source and a low frequency RF power level of the power source, based on measurements by the first impedance probe and the second impedance probe.

29. (New) The substrate processing system of claim 13 wherein the processor is configured to adjust a setting of the impedance tuner based on measurements by the first impedance probe and the second impedance probe.

30. (New) The substrate processing system of claim 24 wherein the computer processor is configured to adjust a pressure in the deposition chamber based on measurements by the first impedance probe and the second impedance probe.